

Claims

[c1] An autostereoscopic display apparatus for displaying a subject in still or motion picture, said display comprising of:

- a) A backlighting means for projecting light in a form of a non-diffuse light source that emanates light rays that have a predetermined direction at every point on the surface of the spatial light modulator.
- b) A spatial light modulator for modulating the light originated from the back lighting means. For the motion picture display case the spatial light modulator modulates light differently at different points in time, which causes motion three-dimensional picture to appear on the autostereoscopic display.
- c) A lens array comprising of plurality of elemental lenses.

[c2] An autostereoscopic display apparatus for displaying a subject in still or motion picture, said display comprising of:

- a) A backlighting means for projecting light. To maximize the effectiveness of the backlighting means it should be a non-diffuse light source that emanates light rays that never intersect on the surface of the spatial light modulator. However, it is not required to be such a light source.
- b) A spatial light modulator for modulating the light originated from the back lighting means. For the motion picture display case the spatial light modulator modulates light differently at different points in time, which causes motion three-dimensional picture to appear on the autostereoscopic display.
- c) A lens array comprising of plurality of elemental lenses wherein every element of the lens array is behaving as a converging lens.
- d) An aperture screen placed in front of the lens array. Said aperture screen comprising of an opaque material with plurality of apertures. Said apertures coincide with spots where the light emitted from the said light source is focused by each elemental lens of the lens array.

[c3] .An autostereoscopic display apparatus according to claim 1 , wherein:

Said lens array comprises of plurality of elemental lenses wherein every

element of the lens array is behaving as a diverging lens.

[c4] . An autostereoscopic display apparatus according to any one of the claims 1 to 3 , wherein:

Said spatial light modulator is a liquid crystal display.

[c5] An autostereoscopic display according to any one of the claims 1 to 4 , wherein:

Said lens array comprises of plurality of lenses at least one of which is a Fresnel lens.

[c6] An autostereoscopic display according to any one of the claims 1 to 4 , wherein:

Said lens array comprises of plurality of lenses at least one of which is a diffraction lens.

[c7] An autostereoscopic display apparatus according to any one of the claims 1 to 6 , wherein:

Said back lighting means is a collimated light source.

[c8] An autostereoscopic display apparatus according to any one of the claims 1 to 6 , wherein:

Said back lighting means is a point light source.

[c9] An autostereoscopic display apparatus according to any one of the claims 1 to 6 , wherein:

Said back lighting means is an array of point light sources.

[c10] An autostereoscopic display apparatus according to any one of the claims 1 to 6 , wherein:

Said back lighting means is a light source that exhibits some diffuse light properties. The aperture screen is used as a device that selects only rays that have a predetermined direction on the surface of the special light modulator.

[c11] An autostereoscopic display apparatus according to any one of the claims 1 to 10 , wherein:

the three-dimensional image information is color multiplexed. For instance the backlighting means may emanate red, green and blue light in

a sequence and the spatial-light modulator modulates each color differently to create a color stereoscopic image.

[c12] An autostereoscopic display apparatus according to any one of the claims 1 to 11, wherein:

said spatial light modulator realizes a modulating photogram or a sequence of modulating photograms. The term "modulating photogram" as defined in the patent's description means a photographic or artificially generated record of an optical field in where the record consists of multiplicity of independent and non-overlapping minute, elemental images each of which is a projection of a large portion of the field.

[c13] An autostereoscopic display apparatus for displaying a subject in still or motion picture, said display comprising of:

a) An image projector or a collection of such. Said projectors emitting non-diffuse light wherein every ray has a predetermined direction at every point on the surface of the lens array. Effectively, this unites functionality of backlighting means together with the spatial light modulator of the claim 1.

b) A lens array comprising of plurality of elemental lenses.

[c14] An autostereoscopic display apparatus for displaying a subject in still or motion picture, said display comprising of:

a) An image projector or a collection of such. Said projectors emitting light that may be diffused. In order to maximize the effectiveness of the backlighting means the light should be non-diffuse light wherein every ray has a predetermined direction at every point on the surface of the lens array.

b) A lens array comprising of plurality of elemental lenses wherein every element of the lens array is behaving as a converging lens.

c) An aperture screen placed in front of the lens array. Said aperture screen comprising of an opaque material with plurality of apertures. Said apertures coincide with spots where the light emitted from the said light source is focused by each elemental lens of the lens array.

[c15] An autostereoscopic display apparatus according to any one of the claims 12 to 13 , wherein:

said light emitting projectors are LCD projectors.

[c16] An autostereoscopic display according to any one of the claims 13 to 15 , wherein:

said lens array comprises of plurality of lenses at least one of which is a Fresnel lens.

[c17] An autostereoscopic display according to any one of the claims 13 to 15 , wherein:

said lens array comprises of plurality of lenses at least one of which is a diffraction lens.

[c18] An autostereoscopic display apparatus for displaying a subject in still or motion picture, said display comprising of an image projector or a collection of such wherein each projector emanates light with a predetermined directional distribution of light in intensity and color. Effectively, this unites functionality of backlighting means together with the spatial light modulator, lens array and the aperture screen of the claim 2.

[c19] An autostereoscopic display according to any one of the claims 13 to 17 , wherein:

the three-dimensional image information is color multiplexed. For instance separate projectors could be used for presentation of different colors in the autostereoscopic image. For instance, one set of projectors could be used for red color, another for green and yet another for blue.

[c20]

An autostereoscopic image capture and reproduction system similar to television, said system comprising of:

a) Three-dimensional image capture apparatus for capturing a three dimensional scene including light color and irradiance at all points of some window in space for all directions within a certain field of view. Such apparatus could be any of the integral photography cameras described in the prior art.

- b) An autostereoscopic display apparatus according to any one of the claims 1 to 18.
- c) A transmission system for transmitting information about a three-dimensional scene from said three-dimensional image capture apparatus to said autostereoscopic display.

[c21] An autostereoscopic image capture and reproduction system according to claim 19 , wherein:

the information about the three-dimensional scene is stored in some form during the transmission process. This transmission may be completed later and the three-dimensional scene will be recreated on the autostereoscopic display.

[c22] An autostereoscopic image capture and reproduction system according to claim 19 , wherein:

the information is transmitted by means of electromagnetic waves propagating in cables, waveguides or as airwaves.

[c23] An autostereoscopic display that comprises of several autostereoscopic displays according to any one of the claims 1 to 19 .

[c24] An autostereoscopic display according to claim 23 wherein:
the collection of elementary displays forms a surface that may not be flat and may enclose some volume in space. Such display can be used to show a three-dimensional scene from every direction.

[c25] An autostereoscopic display according to any one of the claims 1 to 19 wherein:
the outer surface is not flat and may enclose some volume in space. Such display can be used to show a three-dimensional scene from every direction.